Management Perspective for TQM Solution

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Abstract

Quality management is an important research topical in construction industry. The aim of this paper is to review and investigate, via extensive literature reviews, the management perspectives when construction organization implementing total quality management (TQM). If it can be operated successfully and is functioned well, competitive advantage will be enhanced that may lead to eight beneficial areas [improve quality and environmental performance; broaden business opportunities; benefit the community; increase market share; improve finance situation; enhance organizational effectiveness; streamline response to legal issues and lessen insurance budget] which favour commercial viability. However, there are challenges in doing so which include inexperience, resources and administrative constraints, inadequate management skill, and cultural differences. Therefore, in order to foster quality culture, it needs four management directions, namely construction management (CM), knowledge management (KM), project management (PM) and human resources management (HRM). One can reasonably conclude that the quality improvements by TQM are going to create long term commercial advantages.

Keywords

Construction Business; Total Quality Management; Management Implication

Introduction

Total Quality Management (TQM) concepts in a form of "quality circle" were first established in Japan. This quality circle is a volunteer group composed of workers under the leadership of a dedicated leader to analyse and solve work-related problems and present practical solutions to management in order to improve the overall quality performance of a piece of work. TQM can apply to business and has been successfully adopted in many industries which is also applicable to the construction industry. For example, Japanese construction companies, benefiting from the experiences of Japanese manufacturers, began implementing TQM during the 1970s (Arditi and Gunaydin 1997).

There are numerous research studies about quality issues of construction industry (McKim and Kiani 1995; Wong and Fung 1999; Bowen, K.A. Hall et al. 2002; Dlungwana and Rwelamila 2003; Zeng, Tian et al. 2005). However, there appears in short of comprehensive research studies about management perspectives pertaining to TQM to increase business opportunities and enhance competitive advantage. The aim of this paper is to investigate, via extensive literature reviews, the "how and what" for construction organization implementing TQM to gain commercial viability and enhance competitive advantage.

This paper is structured as follows. Firstly, an overview of nature and characteristics of construction industry is discussed. It follows by reviewing the significance of TQM solution and benefits to deal with poor quality problems in construction, and that it leads to challenges, management implications and potential commercial viability when TQM is successfully implemented. Finally, conclusions are presented.

Nature and Characteristics of Construction Industry

Construction industry is always important in the economy. For example, in Australia, according to (ABS 2012), during 2010-2011, "Construction" was the third GDP contributor with 7.7% share after "Finance and Insurance Services" with 9.7% and "Manufacturing" in 8.1%. At August 2012, there was nearly one million people employed, representing 8.5% of the total workforce (ABS 2012). However, "Construction" should not be so narrowly defined to include only on-site activities. For example, the definition of "Construction" adopted by the Census and Statistics Department in Hong Kong refers to activities undertaken by contractors for the construction of buildings and other structures and facilities. If a broader view is be adopted and taken more construction-related activities into account, and based on the re-ordering method of (Rowlinson and Walker

1995), construction-related activities include architectural, surveying and project engineering services, real estate development, leasing, maintenance management, brokerage and agency, property holding and resale, and ownership of premises. According to Leung and Wong (2005) using the 2002 data of Hong Kong, "construction" represents 4% GDP share. However, when the contributions of construction related activities are grouped into a single category, construction industry accounted for 22% of GDP. This broader definition also applies to the Australian construction industry, because off site prefabrication, architectural, surveying, engineering services, real estate professions, leasing, maintenance management etc. are strongly cohered with construction projects. This concept further strengthens the contribution and importance of construction industry in the Australian economy.

Therefore, it is essential to continuously investigate the quality management issues and management implications to promote effectiveness and productivity in the construction industry.

TQM Solution for Construction Industry

From the perspective of the client in building construction, quality means "value for money" (Flanagan and Tate 1997). According to Omachonu (2004), the total quality concept as a business strategy began to grow in popularity in the late 1980s and early 1990s, and TQM is the integration of all functions and processes within an organization in order to achieve continuous improvement of the quality of goods and services. In fact, TQM has been accepted as one of the most prominent management approaches for maximising organisational performance in terms of improving products, processes and people (Lewis, Pun et al. 2007). When choosing appropriate TQM system, (CIRIA 2000) pinpoints four key benefits any kind of integrated management can bring to a construction project: 1. an overall reduction / removal of the duplication of paperwork that arises from operating separate management systems that possess similarities; 2. an improvement in the delivery of the specified product to the customer/client; 3. improved communication with the project team; 4. improvements in delivery and communication are linked to reduction of risk in a project. Therefore, the integration of quality and environmental plans is a natural alliance. Mouatt (1997) has discussed the possibility of combining ISO9000 with ISO14000 indicating the complimentary relationship that exists between the two standards. There have been several international suggestions of combining the two standards as well as making the standard a government required "National Standard" for all businesses in countries such as Japan. The author also believes that companies ISO9000 certified "have an advantage to gaining ISO14000 certification". Furthermore, under certain conditions the two audits may be combined.

In fact, TQM concept is widespread in various countries. Hoonakker, Carayon et al. (2010) conclude that quality and productivity improvement implementation in construction has been effective in the USA, Australia, Canada, Japan, Europe, Hong Kong and Singapore. Attempts have been made to implement TQM practices in the building and construction industry, mostly relying on the ISO9000 [i.e. Quality Management] and ISO14000 [i.e. Environmental Management Systems] standards. Research studies suggest that implementing integration of these two standards for construction benefits both quality and environmental management systems (EMS) in a form of an overall TQM solution (Karapetrovic and Willborn 1998; Zeng, Tian et al. 2005; Simon, Bernardo et al. 2011).

The ISO9000 family addresses various aspects of quality management and the latest ISO 9001:2008 sets out the criteria for a quality management syste[1], whilst the ISO14000 series deals with various aspects of environmental manageme[2], and the series provides construction enterprises with the tools to address the adverse impacts of their operation in a structured manner with the goal of attaining sustainable construction (ISO 2000). Therefore, ISO standard can provide the basis for TQM solution.

TQM quality initiatives provide greater business performance improvement opportunities (Dick 2000), and therefore it is worthwhile to study the beneficial areas of TQM in construction business.

Beneficial Areas of TQM

The broad intention of ISO9000 and ISO14000 integrated TQM system is to provide the framework for a holistic, strategic approach to the organization's

[1] Refer to http://www.iso.org/iso/home/standards/management-standards/iso_9000.htm accessed on 10 October 2012

[2] Refer to http://www.iso.org/iso/home/standards/management-standards/iso14000.htm accessed on 13 October 2012

environmental policy, plans and actions. In fact, implementation of an ISO14000 compliant EMS is a positive and proactive response to the key environmental pressures facing the construction industry today (Cassells and Lewis 2011). Environmental issues and sustainable development are capturing the world's attention more than ever and the construction industry is viewed as a major source of such environmental problems due to its excessive resource consumption, high emissions and large outputs (Dahlgaard, Khanji et al. 2007). While the "need" is undeniably clear, it must be understood that in order for an EMS to be widely and enthusiastically adopted by this cost focused construction industry, a high level of commercial viability needs to be clearly demonstrated. The ISO9000 and ISO14000 compliant quality, EMS and TQM concepts can favourably benefit construction business via the following eight areas:

Improve Quality and Environmental Performance

The fist and utmost is an EMS compliant TQM framework can improve all quality and environmental performance. An EMS can reduce operation costs by using less raw materials and conserving energy. It can also reduce the costs of doing business and increased profits since greater efficiency means using less material, time and energy. Efficiency, environmental and business performance, and compliance with mandatory standards can also be improved by implementing an EMS (Battisti and Perry 2011).

Broaden Business Opportunities

According to Baxter (2004), environmental awareness amongst consumers continues to grow, and providing the quality and price are right, opportunities exist for winning new sales and consolidating existing business by promoting the environmental characteristics of the products/services. Construction clients are becoming increasingly quality and environmentally conscious and are selecting products and services that do not harm the environment. Major clients have started to insist all stakeholders involved in a project to comply with environmental management project requirements. Furthermore, customer trust is enhanced by a commitment to demonstrating environmental management and the flow on effect can be a strengthened relationship between construction firm and client group (Zeng, Tam et al. 2003). Cassells and Lewis (2011) suggest that businesses of all sizes will need to face what is expected to become a de facto international standard for proactive environmental practices. This will become an attraction to the clients that may help construction companies with TQM programme to broaden business opportunities.

Benefit the Community

An EMS helps construction companies to maintain good community relations and enhances public image. Qi et al. (2012) states that the external motivation in the implementation of quality management includes enhancing companies' image and responding to pressures from the community. Bebbington and Gray (2001) express that healthier community's result from reduced exposure to hazardous wastes and chemicals. A company's networks and reputation can be strengthened by an EMS. Improved relations with local and national non-governmental organizations may also result. Such image enhancing results would be seen as especially valuable for construction companies operating in the highly competitive environment.

Increase Market Share

Rodgers (2010) highlights the way in which an EMS can serve as a valuable marketing and promotion tool and can improve a company's competitive advantage. Companies without sound environmental practices may not be able to take advantage of new commercial opportunities while companies with an EMS can become more competitive in the increasingly tight property market. Therefore, construction companies may increase their market share by minimizing the environmental impact of their operations through better designs and cleaner production.

Improve Finance Situation

According to DSEWPC (2012), an EMS can improve relationships with investment bankers, lenders and stocks and bonds brokers. As multiple channels of finance may fund the modern construction project, this assurance can offer a huge financial advantage to construction companies.

Enhance Organizational Effectiveness

Higher productivity is one of the prominent benefits of TQM (McKim and Kiani 1995; Hoonakker 2006; Hoonakker, Carayon et al. 2010). According to Turk (2009), an EMS can help to build employee awareness about the production process by encouraging employee involvement in identifying problem areas. Therefore, staff's productivity is enhanced by an EMS

of TQM practices which benefit the construction company's organizational effectiveness.

Streamline the Response to Legal Issues

Sometimes, construction companies may face difficulties in responding to complicated legal issues related to occupation, health and safety incidents (Fraser 2007) as well as environmental legislation (Ofori, Briffett et al. 2000). Implementation of a successful quality and EMS may help construction companies in dealing with safety issues and obtaining environmental construction permits and authorizations. An integration of TQM of ISO14000 helps to demonstrate compliance with safety and environmental legislation (Karapetrovic and Willborn 1998). In line with this, legal and administrative costs can be reduced by the presence of an EMS and it can also reduce legal liability and risk of prosecution (Mouatt 1997).

Lessen Insurance Budget

Construction companies are facing premium rises in 2012 of between 5 and 10% and are still expected to plateau in the foreseeable future (InterRISK 2012). In some cases, the use of an EMS will allow a company to obtain insurance at a lower cost, because companies that implement an EMS can reduce incidents that result in liability while companies lacking sound environmental practices may be exposed to increased financial and environmental risk (Rodgers 2010). This may lessen company's budget in insurance.

Zeng et al. (2003) argue that for each direct and quantifiable commercial gain, there are countless indirect benefits that can come back as commercial savings and profits in other less obvious ways. An EMS can improve quality, competitiveness and production processes. It also has the potential to reduce expenses, liabilities, insurance premiums, waste management costs while enhancing market responsiveness. An effective EMS can also create a more attractive company from an employment and investment perspective (Ofori, Briffett et al. 2000). For these reasons, Miles, Munilla et al. (1999) state that the EMS should be seen as a critical component of a company's strategy for marketplace success. The real challenge is to highlight the link and connections that exist between implementation and the full scope of fantastic benefits a successful model can bring. However, (Blackburn and Rosen 1993) state that in order to become full partners in the operation of a TQM organization, these partnerships must consider what HRM can do in the areas of selection, training, development, communication, and reward systems pertinent to their various partners within the context of a total quality culture. That means human resources policies to support a total quality culture tend to form a constellation of mutually supportive and interdependent processes. In other words, if construction company want to capture the commercial benefits from TQM, there are numbers of management implication should be resolved prior to fostering a positive quality culture.

Challenges towards TQM

(Dick 2000) states that companies with a strong commitment to TQM will have better business performance improvement than those companies which just only have quality certification. That means TQM is not an automatic solution until it is fully functioned. Notwithstanding the benefits and commercial viability as illustrated, there are several considerations and perhaps challenges of adopting TQM concepts in construction business.

Baxter (2004) concludes those barriers in adopting EMS compliance quality programme: 1.lack of awareness; 2.resource constraints [including financial, time and personnel]; 3.lack of incentives; 4.lack of skills; 5.lack of guidance and support. Coyte et al. (2012) also suggests that there are four main barriers that are felt by construction companies specifically: 1.resource and administrative constraints; 2.lack of an objective inside environmental audit team; 3.unique entrepreneurial culture that is prevalent in construction companies; 4.cost of third party registration.

Perhaps, TQM process is complicated due to the differing management style between the expatriate and local managers in many multinational firms, high employee turnover etc. Continued effort has to be put in training and educating the reluctant managers to adopt the TQM concept, thereby establishing uniform management commitment. Managers and supervisors across-the-board need to take the initiative to direct the employees towards the goal of continuous quality improvement (Gurnani 1999).

If QM and EMS is a probable solution of TQM, the direction of overall quality policy is about how to fit it into the companies' management model to foster a quality culture. For quality to be "built in", a culture of quality improvement must be established and nurtured. This requires commitment from

management and the necessary resources applied to ensure that systems are efficient and workable. Therefore, various management implications are also required. According to (Chan 2012), there are four management considerations when implementing TQM in construction business: construction management, knowledge management; supply chain management and marketing management. Amongst the eight management competencies as stated in the Project Management Body of Knowledge, exercising PM techniques to assure quality in each construction project; and using HRM approach to utilize available personnel resources are both vitally important to achieve the highest quality standard. The following analysis is built on the foundation of (Chan 2012)'s study and discusses efficient and effective deployment of project management competency and organizational human resources for TQM solution. This includes how construction organization may focus in CM and PM techniques and adopt knowledge management and human resource management strategies to foster quality culture.

Construction Management Perspective

In every project, it is compulsory for a construction organization to meet the minimum standard requirements [i.e. quality standard]. However, it does not always appear to be a major concern and priority for most construction organizations. Instead, competition seems to be primarily focused on cost (Calver and McLaughlin 2003). The highly competitive, heavily regulated and fragmented nature of the construction industry coupled with the volatility of market conditions subject construction contractors to fluctuating demand levels. It is essential to improve CM skill which will definitely help construction company to compete, not just cut-throat cost but more in quality performance, in the volatile market. In fact, construction industry has been repeatedly critics for its poor performance on quality and cost. Quality management has increasingly been adopted by construction organizations as an initiative to solve quality problems. Better quality products and higher market share are often obtained with the adoption of TQM by the construction organizations. (Kanji and Wong 1998). Aldridge and Oakland (1995) say that if ever an industry needed to take up the concept of TQM, it is the construction industry, because the industry does not appear to understand the concept of TQM, though contractors do see obvious benefits of quality improvement. McKim and Kiani (1995) also point out that by applying TQM, better construction can be achieved. Chase (1998) is contend in the construction industry, TQM as a tool can help to improve performance and application of TQM concept to the jobsite has been proven to speed-up projects while increasing profitability. All these are matter of improving CM perspectives.

Kanji and Wong (1998) state that the supply chain in the construction industry is owner>consultants>main contractor>subcontractors/suppliers>suppliers.
Sometimes, suppliers will also be involved to supply the required materials, either to the main contractor who hands them to the subcontractor to fix and install, or directly to the subcontractors. Those subcontractors or suppliers are usually small and medium-sized contractors (SME) in a project. Each actor in the supply chain has its role to play. The owner employs consultants like architects and engineers to design the project. The main contractor is then selected to construct the project according to the design. The main contractor will employ many domestic subcontractors, plus other subcontractors named or nominated by the client to carry out the construction work. Subcontracting is a feature of the construction industry that has been identified as a source of poor quality and overall poor business (Lin 2011). Dlungwana and Rwelamila (2003) state that the challenges facing SME are in lack of resources for training contractors, such as funds, poor construction procurement systems and lack of management capacity and resources to equip managers to operate their business enterprises effectively and efficiently. Thwala and Phaladi (2009) add that those small contractors are generally in lack of business management skills. In short, those SME are generally poor in CM. Achievement of high quality performance needs more competent CM skills by the main contractors [i.e. construction organization] which lead to a potential competitive edge in the industry. According to McKim and Kiani (1995), applying TQM often requires a new perspective of existing practices. Normal contractual relationships between owners, contractors, subcontractors, and suppliers, regardless of the industry, often create an adversarial atmosphere in the work environment. This ever-increasing global competitive nature of the business environment has forced corporations to develop strategies to become low cost producers and to differentiate their goods and services from their competition. If supply chain management becomes mandatory in the total quality objectives of a main contractor in the construction

industry, the quality management tasks of a main contractor are complex, given the totality of quality features demanded by customers, as well as the multitude of actors in the supply chain, each bearing differing objectives, technology, resources, and level of interdependence with other upstream and downstream actors (Wong and Fung 1999). Lewis et al. (2007) state that this becomes critical for top management not only to recognize the critical nature of their role but to be clear on content and process. The key objectives of management commitment are therefore environmental and quality focused. In the construction industry, the message of TQM must be spread to each level as well as tight quality control is enforced in each tier of the chain. Therefore, construction organization improves its TQM in supply chain is a "must" before competitive advantage is increased.

According to Chan (2012), there is no doubt that TQM improves CM and thus enhances competitive advantage. In fact, there is enormous potential for TQM in the construction process, as project delivery and success has been traditionally viewed and measured as management of a three-legged stool, with the legs defined as cost, schedule and quality (Chan, Walker et al. 2006). In a construction project, as a guide, increase in quality results in an increase in time; increase in time results in an increase in cost; increase in quality results in an increase in cost. The decision is quality is value for money. Construction management is the overall planning, coordination, and control of a project from inception to completion aimed at meeting a client's requirements in order to produce a functionally and financially viable project. Therefore, the direction of the construction organization pursuing TQM is hinged on how to effectively manage those SME to spread and foster the quality culture within the supply chain and every project.

Project Management Perspective

According to Uysal (2012), one objective of TQM is to produce customer satisfaction. Each employee and business unit (i.e. every project in construction organizations) is responsible for TQM achievements. In other words, TQM requires PM. In fact, project manager is a profession that arose from construction and now is working successfully in other fields, such as telecommunications, defence and marketing. According to the PMI (2008), quality management is one of the core PM competencies. It is prominent in construction project, and worth to note that plan quality is the process of identifying quality requirements and/or standards for the project and product, and documenting how the project will demonstrate compliance (Stackpole 2010). Therefore, when construction organizations can incorporate TQM and link their projects to business strategy, they are better able to accomplish their organizational goals [such as productivity and profitability]. In fact, project quality management includes the processes and activities of the performing organization that determine quality policies, objectives, and responsibilities so that the project will satisfy the needs for which it was undertaken (Stackpole 2010). Each project is goal-oriented and has the clear objective of creating some new entity which did not exist before. In other words, projects are made up of a large number of separate but independent tasks and are unique. Each project task demands on a range of resources, usually on a varying basis. This includes the primary intention for the project, contractual arrangements, other legal and financial relationships, and the particular people and organisations involved. These will differ from one project to another, even though they may be in similar locations at the same time. That means although there is TQM policy but the prescribed quality standard for each project may not be the same. According to Wikström, Artto et al. (2010), proper business model is essential for value creation and company performance. The project-based organization [i.e. construction company] is widespread in traditional industries including construction business. TQM message from the headquarters of the construction organizations sometimes may not thoroughly pass to each project and quality standard may also not completely align amongst different projects. Therefore, this is extremely important to streamline the TQM by project management techniques.

According to Hobday (2000), project management has to perform a highly complex internal task of balancing the various internal interests and meeting the different demands e.g., in terms of reporting and quality control of the departments. Srivannaboon (2006) adds that recognition of the strategic importance of PM in the corporate world is rapidly accelerating. One reason for this may be a strong belief by business leaders that aligning project management with business strategy can significantly enhance the achievement of organizational goals, strategies, and performance. Projects are the basic building blocks of organizational strategy in many companies; the essence of PM is to

support the execution of an organization's competitive strategy to deliver a desired high quality outcome.

Hobday (2000) states that the project-based organization is inherently weak in coordinating cross-project resources. In other words, each project within the construction organizations may work against the wider interests of the corporate strategy such as TQM. If construction organizations cannot use proper PM techniques to align the quality goal, their TQM policy will never be easy to implement successfully in each project. Because construction projects are generally resourced by the heads of the functional departments, while project managers were nominally in charge of projects they had no direct staff or control over resources (Hobday 2000). Construction organization must enforce project team so that the TQM message can be transformed to quality culture in every project.

Knowledge Management Perspective

There is something between TQM and KM in common (Chan 2012). Loke et al. (2012) state that the purpose of TQM and KM practices focuses on work-processes improvement on a firm so that high customer satisfaction can be derived. When study KM in construction industry, managing knowledge properly can lead to the knowledge advantage which can ultimately facilitate sustainable competitive advantage (Chan et al. 2006). Dent and Montague (2004) also say that KM is not a purpose in itself rather. Organizations in the construction sector do not exist primarily to disseminate and enhance construction-related knowledge; rather they exist to sell the provision of services and products to the marketplace. But, as competitive advantage relies on informed decision-making within such companies, KM will be a decisive component of successful future businesses. Therefore, effective management of knowledge in the construction industry is likely to produce innovation, reduce project time, and improve quality and customer satisfaction (Love, Li et al. 2000; Kamara, Augenbroe et al. 2002). Obviously, knowledge has been recognized as a vital resource and source of competitive advantage in today's dynamic and changing business environment (Burton-Jones 1999). According to (Chan 2012), it is worthwhile applying the KM approach to TQM in order to facilitate innovations, effectiveness of business processes and thus provide organization competitiveness in the market.

However, Gann and Salter (2000) state that the way of project-based actors stored, accessed and developed information, i.e. the KM practices must be extended from the central parts of the firm to individual projects. In other words, KM for TQM must be spread over each project. Barlow (2000) adds that many of the construction industry's performance problems stem from inadequate inter-organisational co-operation. Quality problems of one project may not share with others, and quality knowledge resolving the problems is not stored and reused in other projects inter-organizationally. Lawson (1992) state that even most managers do not know what TQM is. They do know that they have to deal with a great range of problems and they need something to help them; they hope that TQM will do this. What they really need is a system which gives them and their employees a common frame of reference, understanding, and tools so that they can totally change the way in which they operate such that they anticipate and prevent problems; stop producing and delivering defective goods and services, and give the customer exactly what he wants. In other words, some managers do not have KM concept to deal with TQM because there is no proper knowledge sharing platform and transferring tacit knowledge in respect of quality matters is difficult.

According to Dyer and Nobeoka (2000), in order to efficiently transfer more complex quality knowledge and ensure the network is efficient at tacit knowledge transfers, organization should create a highly interconnected, strong tie network with a variety of processes that facilitate knowledge transfers. The network has multiple pathways among members. Dent and Montague (2004) argue that the knowledge-sharing environment has significant implications for staff competencies. The purpose of the lesson-learning portal can provide a platform for participants on various projects to share lessons learnt and knowledge gained. The study by Chan (2009) indicated that there are many differences in practice in different projects, such as quality requirements and assurance, resources planning and work sequences; and that these issues must be closely monitored and contained. Since any overlooking of these factors at the early stage of the project may adversely affect the overall project performance. An effective system is required to capture everything that is learned from such experiences and transforming such useful information into knowledge and reuse in other projects. Making such knowledge more explicit is a major goal for the future. Therefore, construction organizations must think of providing a knowledge sharing platform for

all projects. It is because some types of knowledge is explicit and may be easily codified and transferred in a large group setting, whereas other types of knowledge is tacit and require intense interaction and are likely to be successfully transferred only in a small group setting at the specific location where the knowledge is used. Although quality requirement is well documented as specification, working knowledge towards to satisfy quality standard is tactic. Each project may have one's own way in "quality"; TQM can only provide a guideline.

Leonard and Sensiper (1998) define tacit KM as including mentoring, demonstrations and communications as the tools available to managers to ensure that the KM strategy is successful. (Aboyassin, Alnsour et al. 2011)'s study indicates that KM processes [diagnosing, acquiring, generating, sharing, storing, and application] do influence TQM. Therefore, adopting proper KM strategy will help a construction organization to implement TQM policy much effective and efficient.

Human Resource Management Perspective

According to the PMI (2008), HRM is one of the core PM competencies. Uysal (2012) suggest that HRM, in quality system, can be related to organizational positions in an organizational chart. An organizational position contains task and employees, and it is employees' duty to implement tasks. Therefore, if all employees do their tasks and jobs at best (high individual performance), the total performance of company will increase (business performance). Therefore, at the outset of a project, key activities therefore comprise selection of the right people, development of their skills and management of their interaction within the project team. When developing the human resource plan to implement TQM, this is the process of identifying and documenting project roles, responsibilities, and required skills, reporting relationships, and creating a staffing management plan (Stackpole 2010).

A construction project can simply be defined as any activity with a defined set of resources, goals, and time limit. When implementing TQM, the question is how construction organizations can achieve and maintain high-quality performance in low-resource settings. Snell and Dean (1992) examine the relationship between TQM, and HRM from a human capital perspective. It is important to realize that human capital becomes economically valuable when manifested in performance. It is because that TQM is positively related to those same HRM practices for quality employees, and it is also related to the comprehensiveness of training for employees in operations. Thakurta and Suresh (2012) suggest that the effectiveness of quality assurance process depends on pattern of change order generation and the resource management policies adopted. Given the project setting, overstaffing led to best results under linear rise pattern. However, HRM policy is to keep the project workforce level constant. This could be useful when the project requirements are expected to change initially or at the middle stages, but does not perform effectively when the requirements changes take place towards the end stages of the project. Construction organizations need to trade-off among other performance parameters also before deciding on which policy to adopt given the project characteristic.

Brown (1992) concludes that TQM is a management philosophy which seeks continuous improvement in the quality of performance of human management processes, products and services of an organization. Attention is given to the structure and operation of quality improvement teams and how they fit into the overall quality management programmes. According to Youndt, Snell et al. (1996), a human management system focused on human capital enhancement was directly related to multiple dimensions of operational performance, but the main effect was predominately the result of linking human-capital-enhancing HRM systems with a quality strategy. All these prove the importance of HRM strategies in TQM.

However, when Gotzamani and Tsiotras (2001) examine TQM measurement instrument about the certified companies' performance improvement and their strengths and weaknesses on their way to TQM. Some organizations are significantly lower in the improvement offered in HRM. Particularly low is their performance relative to employees' training and education in quality-related issues, in methods and techniques for quality improvement, in the development of employee participation programs and systems for formal proposals submission, in employee evaluation, appraisal and continuous training, in offering formal incentives for quality improvement, participation and contribution to decision making, as well as in recognising those who contribute towards quality improvement. Thus, HRM constitutes the most challenging and demanding category for those companies that want to proceed to TQM. Applying (Blackburn and Rosen 1993)'s study, moving to a TQM.

Collectively, the HRM policies work to accomplish quality tasks: 1.communicate the importance of each employee's contribution to total quality; 2.stress quality-related synergies available through teamwork; 3.empower employees to "make a difference"; 4.reinforce individual and team commitment to quality with a wide range of rewards and reinforcements. Therefore, the author provides some practical hints from human resource management perspective that can contribute to TQM:

- Top management is responsible for initiating and supporting a vision of a total quality culture.
- This vision is clarified and communicated to the remainder of the firm in a variety of ways.
- Systems that allow upward and lateral communications are developed, implemented, and reinforced.
- TQM training is provided to all employees, and top management shows active support for such training.
- Employee involvement or participation programs are in place.
- Autonomous work groups are not required, but processes that bring multiple perspectives to bear on quality issues are imperative.
- Employees are empowered to make quality-based decisions at their discretion. Job design should make this apparent.
- Performance reviews are refocused from an evaluation of past performance only, to an emphasis on what management can do to assist employees in their future job-related quality efforts.
- Compensation systems reflect team-related quality contributions, including mastery of additional skills.
- Non-financial recognition systems at both the individual and work group levels reinforce both small wins and big victories in the quest for total quality.
- Systems allow employees at all levels of the organization to make known their concerns, ideas, and reactions to quality initiatives. These systems might include suggestion opportunities with rapid response, open-door policies, skip-level policies, attitude surveys.
- Employee recruitment, selection, promotion, and career development programs reflect the new realities of managing and working in a TQM environment.
- While assisting others to implement processes in support of TQM, the HR professional does not lose sight of the necessity to manage the HR function under the same precepts.

If TQM is enabled by human resource management, construction organization can have a better chance to foster quality culture and enhance better commercial viability.

Conclusions

In today's heightened competitive environment, the product and service provided by a construction organization is not simply about satisfying time and cost requirement but the issue is to deliver in a quality manner. Quality improvement must apply to all products and services, small TQM changes will lead to quality improvements and create long term commercial advantages. One can reasonably conclude that successful implementation of TQM will continue to contribute to the broad business benefits. In a more practical way, construction organizations can use the ISO9000 and ISO14000 as the basis for TQM solution. The benefits of ISO standards are directed towards improving effectiveness and productivity. Then, eight areas of commercial viability will benefit construction business. They are: 1.improve quality and environmental performance; 2.broaden business opportunities; 3.benefit the community; 4.increase market share; 5.improve finance situation; 6.enhance organizational effectiveness; (7) streamline response to legal issues and 8.lessen insurance budget. However, construction organizations may face some challenges before attaining "TQM paradise". These include 1.staff lack of awareness; 2.resource constraints; 3.lack of incentives; 4.lack of skills; 5.lack of guidance and support; 6.resource and administrative constraints; 7.lack of an objective inside environmental audit team; 8.unique entrepreneurial culture that is prevalent in construction organizations; 9.cost of third party registration.

TQM is the big picture and concerned with value-added to the production process by eliminating wastage, such as return visit to rectify completed work with inferior quality. This is about "getting it right the

first time". Then, TQM can be perceived as a technique used to ensure that the project meets or exceeds the required quality standards. It comprises quality planning (strategies for achievement), quality assurance (monitoring performance) and quality control (compliance with standards) over the project life. Continuous quality improvement should be the underpinning philosophy on all projects. All these require a management shift for TQM.

Formation of quality culture and subsequent fostering it requires many management implications. Construction industry is notorious and being criticised for poor quality and in lack of corporate social responsibility. Management commitment by each construction organization to quality and to continuous quality improvement is very important in each phase of the building process. This can be done by starting from the CM perspectives. TQM emphasizes on quality improvement and this requires working knowledge of all functional areas with the organization. Sometimes quality is tactic and construction organization should provide an effective knowledge sharing platform to transfer quality experience from one project to another. Obviously, it is about running the KM in the construction organizations. Construction project has particular problems associated with the transient nature and the uniqueness of work, but quality assurance must be consistent. Project quality management plan must be operated in line with the overall company's quality policy. TQM is concerned with a holistic approach to continuously meeting owners' needs in the most competitive ways and this requires the proper project management competency to run the TQM in each project. It is the management responsibility for TQM commitment but the success requires the participation of all members of the team, and therefore it remains the responsibility of management to provide the resources needed to succeed. Of course, this is a matter of human resource management in TQM.

As a concluding remark, quality is not an extra cost for the construction organization; rather it is a way to increase productivity. This requires TQM supported by various management perspectives. The application process requires major shifts in management philosophy, practices, and policies related to the pursuit of improved quality. Implementing TQM policy should be championed by top management of a construction organization. However, quality is not merely a "top down" solution, but requires the positive "bottom up" actions from the other end. Quality should never be treated as an unnecessary or inconvenience but it must be practised routinely at all levels of the organisation.

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